MARSHALL DAY Acoustics

# WANI ROAD CHICKEN BROILER FARM
# ASSESSMENT OF NOISE EFFECTS

Rp 001 20240148 | 16 May 2024

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Project: **WANI ROAD CHICKEN BROILER FARM**

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Report No.: **Rp 001 20240148**



## Document Control

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## 1.0 REPORT SUMMARY AND CONCLUSIONS

*Our assessment confirms that project noise will comply with the rural zone limits in the Hauraki District Plan (HDP). Noise received at dwellings may be externally audible some of the time. Night-time noise inside dwellings will likely be inaudible. No adverse noise effects will occur.*

Marshall Day Acoustics has been engaged by Agright New Zealand OpCo 3 Limited (Agright) to assess the noise effects of a proposed chicken broiler farm located in Paeroa.

The primary issue of concern we address in this report is:

- night-time operational noise compliance and potential effects; and
- noise from the construction of the farm, and the management of potential adverse effects arising from this.

We anticipate that construction and operational vibration effects will be negligible, therefore have not been addressed further in this report.

We have constructed a detailed computer noise model of the project. The model calculates noise emissions from all mechanical ventilation plant operating in all periods of the day.

We predict noise levels up to 32 dB $L_{Aeq}$ at the closest dwelling not owned by the applicant. Operational noise complies with the relevant HDP noise limits in all periods of the day. Noise from the site may be externally audible at some receivers some of the time. Night-time noise inside dwellings will likely be inaudible. No adverse effects will occur.

We predict that construction noise will readily comply with the relevant limits during typical daytime construction hours (0730 to 1800 hours, Monday to Saturday). No adverse noise effects will occur.

This report includes recommended conditions of consent.

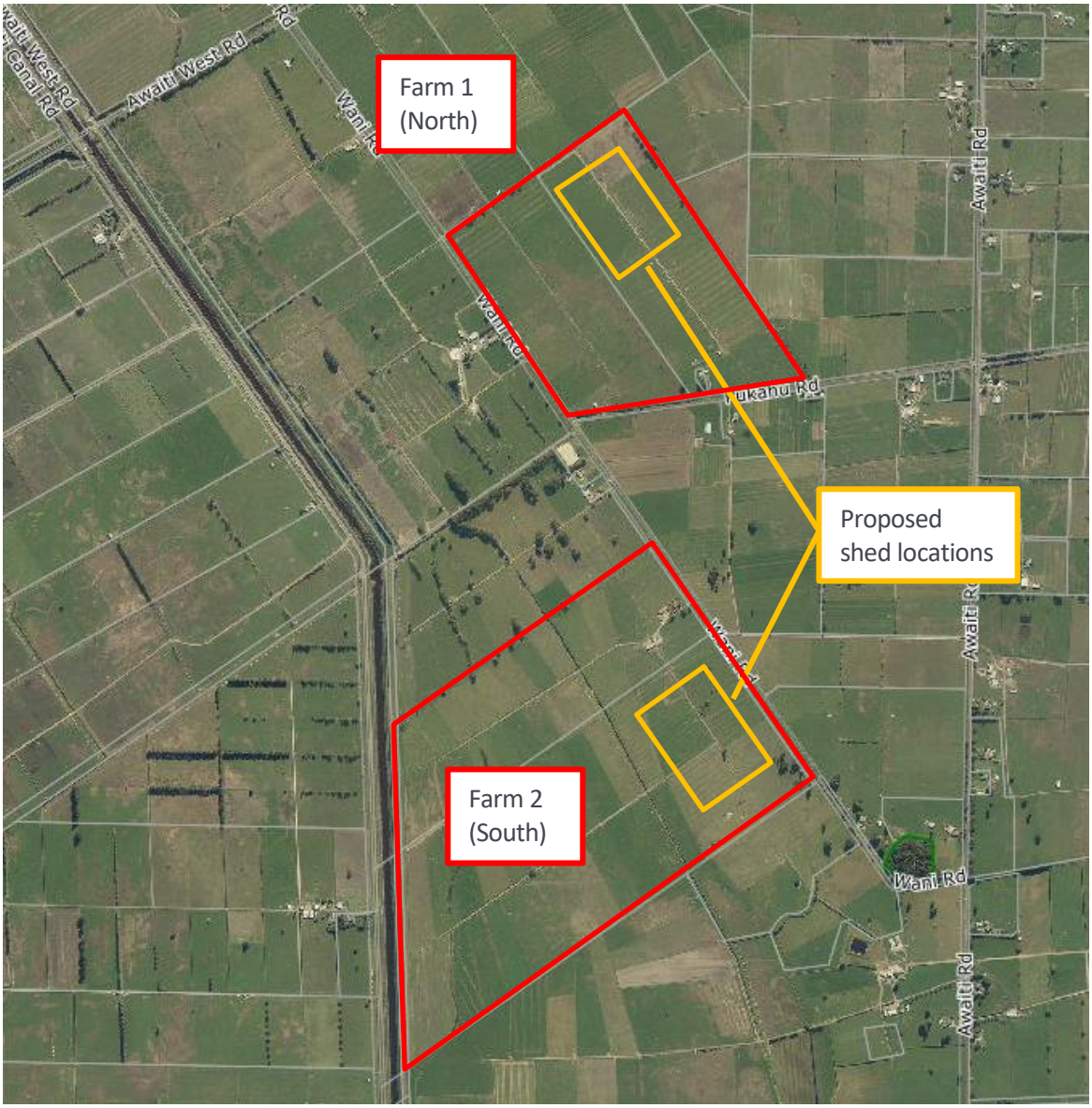
A glossary of terminology is included in Appendix A.

## 2.0 PROJECT LOCATION AND DESCRIPTION

### 2.1 Location

The proposed broiler farm will be located at 780 and 874 Wani Road, Paeroa. The site is currently a 250ha dairy farm. The site and surrounding receiving environment are shown in Figure 1. Both properties are zoned Rural under the Hauraki District Plan (HDP).

**Figure 1: Site location**



## 2.2 Project description

Agright has recently acquired the properties with the intention to establish and operate two new chicken broiler farms. Each farm will consist of:

- Six indoor chicken housing sheds, including:
  - Shed heating system
  - Roof chimney fans and end wall mounted fans
  - Free range areas adjacent to each shed
- Amenity building
- Farm machinery shed
- On-site domestic wastewater treatment and disposal

Preliminary site layouts are attached in Appendix B.

## 2.3 Identified potentially noise sensitive receivers

**Table 1** lists the closest receivers and the distance to the closest site boundary. The table lists each receiver, zoning / primary use, and minimum distance to the closest farm location. If compliance is shown at the identified receivers, then it can be inferred with confidence for all other, more distant, receivers not included in the assessment.

We have excluded the following dwellings from our assessment as they are within the site's land titles:

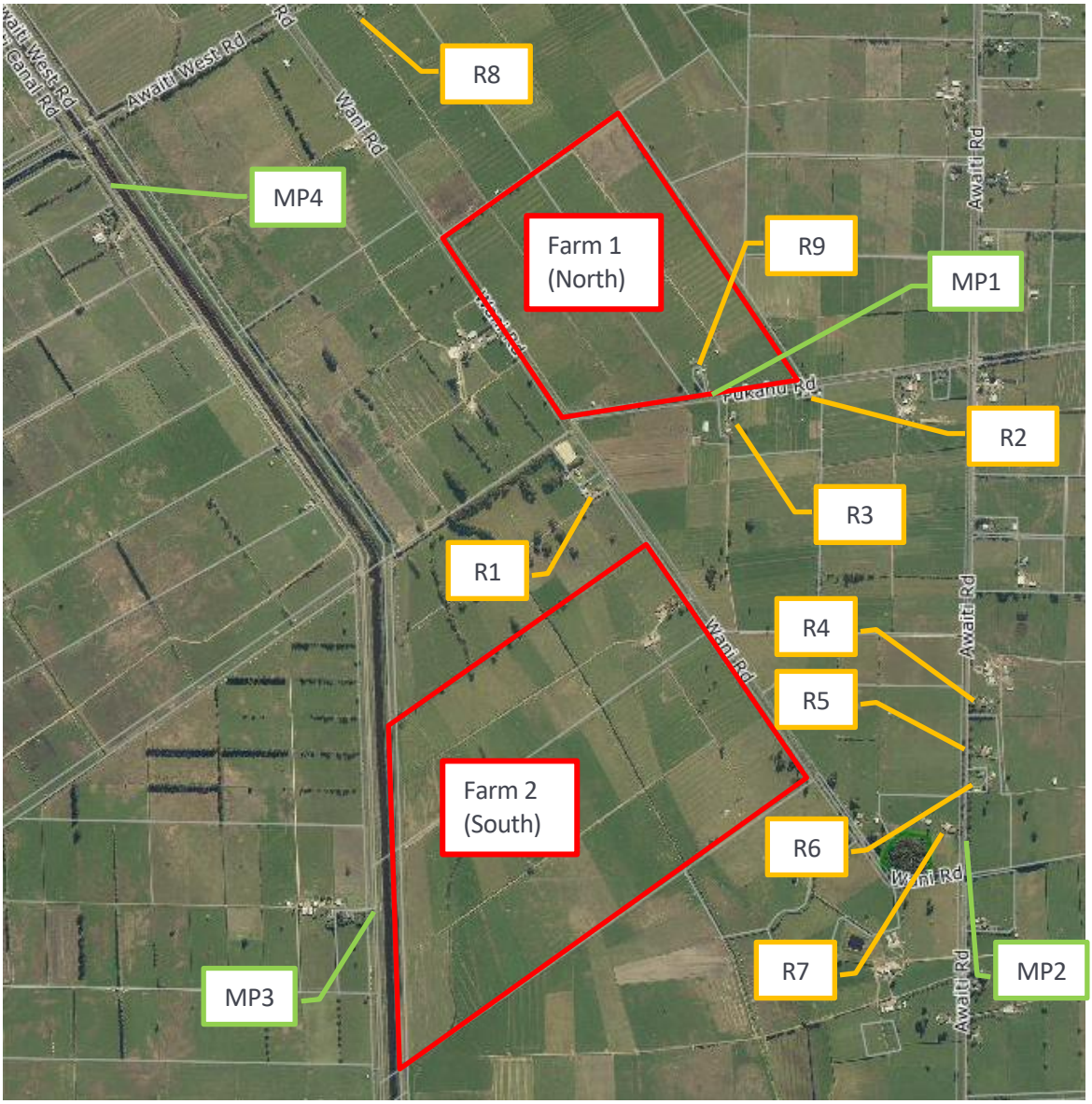
- 708 Wani Road
- 780 Wani Road
- 874 Wani Road

**Table 1: Receiver address and zoning**

| Pos. no. | Address | Zoning / Usage | Approx. distance to site (m) |
|---|---|---|---|
| R1 | 832 Wani Road | Rural / Dwelling | 600 |
| R2 | 457 Pukahu Road | Rural / Dwelling | 620 |
| R3 | 479 Pukahu Road | Rural / Dwelling | 600 |
| R4 | 365 Awaiti Road | Rural / Dwelling | 540 |
| R5 | 367 Awaiti Road | Rural / Dwelling | 500 |
| R6 | 377 Awaiti Road | Rural / Dwelling | 510 |
| R7 | 390 Awaiti Road | Rural / Dwelling | 480 |
| R8 | 203 Awaiti West Road | Rural / Dwelling | 660 |
| **Dwelling owned by applicant:** | | | |
| R9[1] | 484 Pukahu Road | Rural / Dwelling | 420 |

Notes to table:
(1) This dwelling has been excluded from the effects assessment.

**Figure 2: Map of surrounding receivers**



## 3.0 EXISTING AMBIENT NOISE ENVIRONMENT

We visited the site on 18-19 April 2024 between 11pm and 1am to measure the existing ambient noise environment. Figure 2 shows the measurement locations, and the measurement results are listed in Table 2.

Cricket noise has been filtered out where required.

Based on observations whilst on site during the night-time, the existing acoustic environment is typical of a quiet rural setting. Farming activities would likely control the ambient environment during the daytime. Environmental sounds e.g., wind, bird and insect noise would contribute in all periods of the day to varying degrees and would seasonally vary.

**Table 2: Attended noise measurement results**

| Measurement position | Start time | Duration (mm:ss) | Measured noise levels (dB) | | | Noise sources and comments |
|---|---|---|---|---|---|---|
| | | | $L_{AFmax}$ | $L_{Aeq}$ | $L_{A90}$ | |
| MP1 | 10:57pm | 10:19 | 43 | 30 | 26 | Distant traffic, birds, distant cattle. |
| MP2 | 11:23pm | 07:30 | 37 | 26 | 23 | Distant traffic, birds. |
| MP3 | 11:56pm | 12:18 | 50 | 27 | 23 | Leaves rustling in distance. Distant traffic, birds. |
| MP4 | 12:20am | 10:17 | 46 | 29 | 26 | Distant mech services (possibly fan noise). Distant traffic, distant cattle, birds. |
| MP2 | 12:40am | 09:54 | 38 | 26 | 22 | Distant mech services, birds, distant traffic, dog barking. |

## 4.0 ACOUSTIC PERFORMANCE STANDARDS

### 4.1 HDP operational noise performance standard

The relevant receiver zone limits are summarised in the following table.

**Table 3: HDP operational noise performance standard**

| Zone | Standard | Daytime[1] | All other times |
|---|---|---|---|
| Rural | 8.3.1.3(1a) | 50 dB $L_{Aeq(15min)}$ | 40 dB $L_{Aeq(15min)}$<br>65 dB $L_{AFmax}$ |

Note to table:

(1) Daytime is 7.00am – 10.00pm all days

The full suite of limits as they appear in the HDP are contained in Appendix C.

In accordance with Standard 8.3.1.3(1), noise arising from activities must be measured and assessed in accordance with NZS 6801:2008 "*Acoustics – Measurement of environmental sound"* and NZS 6802:2008 "*Acoustics – Environmental noise"*.

### 4.2 HDP construction noise performance standard

Standard 8.3.1.3(3) of the HDP states that noise from any construction work activity must be managed, measured and assessed in accordance with the requirements of NZS 6803:1999 "*Acoustics – Construction noise*".

Standard 8.3.1.3(3a) reproduces the noise limits provided in NZS 6803. We have assumed that the length of the construction period will be greater than 20 weeks (i.e., long-term)[1].

In summary, the noise limits applying to typical construction hours (7.30am to 6pm) are 70 dB $L_{Aeq}$ and 85 dB $L_{AFmax}$ assessed at 1m from the façade of occupied buildings.

## 5.0 OPERATIONAL NOISE ASSESSMENT

*We predict that operational noise from the project will comply with HDP noise limits. Noise received at dwellings may be externally audible some of the time. Night-time noise inside dwellings will likely be inaudible. No adverse noise effects will occur.*

### 5.1 Calculated operational noise levels

Operational noise will primarily be generated by shed mechanical services. Intermittent delivery truck movements will also generate noise; however, we consider this to be a secondary source. We consider the noise generated by free-ranging chickens to be negligible in this (rural) context.

We have predicted operational noise from the site to the notional boundary of the closest receivers. We have used the modelling methodology discussed in Section 5.3. Table 4 below shows the calculated cumulative noise levels at the assessed receivers.

The results confirm that project noise will comply with the relevant noise performance standards at all times of the day.

**Table 4: Calculated noise level to receivers**

| Rec. No. | Address | HDP Noise Limits [D / N] | Calculated Noise Level (dB $L_{Aeq}$) (at all times) | Complies? |
|---|---|---|---|---|
| R1 | 832 Wani Road | [50 / 40] | 31 | Yes |
| R2 | 457 Pukahu Road | [50 / 40] | 32 | Yes |
| R3 | 479 Pukahu Road | [50 / 40] | 32 | Yes |
| R4 | 365 Awaiti Road | [50 / 40] | 29 | Yes |
| R5 | 367 Awaiti Road | [50 / 40] | 29 | Yes |
| R6 | 377 Awaiti Road | [50 / 40] | 31 | Yes |
| R7 | 390 Awaiti Road | [50 / 40] | 29 | Yes |
| R8 | 203 Awaiti West Road | [50 / 40] | 29 | Yes |
| **Dwelling owned by applicant** | | | | |
| R9[3] | 484 Pukahu Road | [50 / 40] | 37 | Yes |

Notes to table:
(1) An explanation of technical terms is provided in Appendix A.
(2) D = Daytime (7am to 10pm), N = Night-time (10pm to 7am)
(3) This dwelling has been excluded from the effects assessment.

[1] Long-term duration construction is defined in Clause 7.2.1(c) of NZS 6803:1999 as "construction work at any one location with a duration exceeding 20 weeks'.

## 5.2 Assessment of operational noise effects

Comparing the calculated noise levels in Table 4 to the existing noise environment (refer to Section 3.0) we note the following:

- Operational noise (up to 32 dB $L_{Aeq}$) will be slightly above the existing night-time ambient noise (up to 30 dB $L_{Aeq}$), and
- Operational noise (up to 32 dB) will be above the range of existing night-time background noise (22 – 26 dB $L_{A90}$) and therefore may be audible at times.

Site noise inside dwellings with windows ajar for ventilation[2] will be below 20 dB $L_{Aeq}$ and will likely be inaudible. On this basis we consider that no adverse night-time effects will occur.

We consider that there will be no adverse day-time effects.

## 5.3 Modelling methodology

We have calculated operational sound levels in accordance with ISO 9613-2:1996[3] using SoundPLAN® environmental noise modelling software. ISO 9613 considers a range of frequency dependent attenuation factors including atmospheric absorption, ground and barrier effects, directivity, as well as spherical spreading.

The model considers the noise emission from all significant sources associated with the operational broiler farm as described below.

***Mechanical Services***

We understand that the ventilation requirements in the farm sheds will differ with bird age, humidity and ambient temperature. Fans will therefore be turned on and off as required.

Our calculations are conservative in that we have modelled all fans as operating at full duty simultaneously for all sheds. This includes the Fantech 1680 fan which is a VSD fan and will likely not run at full duty most of the time. However, this approach allows us to model a conservative worst-case noise envelope.

We have used the sound power level data contained in Appendix D to predict operational noise for the broiler sheds.

***Vehicle Movements***

Heavy vehicle movements are estimated to be an average of two truck trips per day, per farm[4]. The farms are spatially spread out and will have separate access roads. This will have a negligible effect on operational noise levels. For these reasons we have not modelled vehicle noise.

[2] We have assumed 15 decibels is the maximum attenuation that can be achieved with a partially opened window.

[3] ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

[4] Section 2.2.11 *Chicken Broiler Sheds – 780 & 874 Wani Road, Paeroa* – Mitchell Daysh

## 6.0 CONSTRUCTION NOISE ASSESSMENT

*We predict that construction noise will readily comply with the relevant limits during typical construction hours. No adverse effects will occur.*

### 6.1 Calculated typical construction noise levels

We have assumed the construction works associated with the project will consist of:

- Site enabling works and bulk earthworks;
- Foundations and structures;
- Construction of main buildings;
- Site landscaping and remediation.

The following tables predict construction noise for the above work stages.

We anticipate the plant and activities shown in the following subsections will be used during construction. The tables include the per unit sound power level, calculated level at the closest receivers, and the minimum distance required to comply with the construction noise limit (refer to Section 4.2).

#### 6.1.1 Site enabling works/landscaping

Noise from construction activities is expected to readily comply with the relevant daytime noise limits.

**Table 5: Calculated earthworks construction noise levels**

| Activity | Equipment | Sound Power | Façade Noise Level (dB $L_{Aeq}$) | | | Limit Setback (m) |
|---|---|---|---|---|---|---|
| | | (dB $L_{WA}$) | R1[3] | R2[4] | R3[5] | 70 dB $L_{Aeq}$ |
| Site enabling works | 30T excavator | 105 | 41 | 39 | 39 | 30 |
| | Truck and trailer | 105 | 41 | 39 | 39 | 30 |
| Strip topsoil and bulk excavation to form building platform | 30T excavator | 105 | 41 | 39 | 39 | 30 |
| | 5-axle dump truck | 106 | 42 | 40 | 40 | 33 |
| Site landscaping and access roads | 7T excavator | 102 | 38 | 36 | 36 | 22 |
| | 30T excavator | 105 | 41 | 39 | 39 | 30 |
| | 3-axle dump trucks | 106 | 42 | 40 | 40 | 33 |
| | 5T static/vibratory roller | 103 | 39 | 37 | 37 | 22 |
| | Bitumen truck | 103 | 39 | 37 | 37 | 25 |

Notes to table:

(1) Appendix A provides an explanation of technical terms
(2) In accordance with Section C.2 of NZS 6803: 1999 inclusive of 3 dB facade reflection
(3) R1 represents façade of 484 Pukahu Road located 440 m from the edge of construction
(4) R2 represents façade of 367 Awaiti Road located 520 m from the edge of construction
(5) R3 represents façade of 377 Awaiti Road located 530 m from the edge of construction
(6) The maximum noise level limit (85 dB $L_{AFmax}$) will be readily complied with at all receivers

### 6.1.1 Construction of main buildings

Noise from construction activities is expected to readily comply with the relevant daytime noise limits.

**Table 6: Calculated construction noise levels – Construction of main buildings**

| Activity | Equipment | Sound Power | Façade Noise Level (dB $L_{Aeq}$) | | | Limit Setback (m) |
|---|---|---|---|---|---|---|
| | | (dB $L_{WA}$) | R1[3] | R2[4] | R3[5] | 70 dB $L_{Aeq}$ |
| Foundations | Concrete truck and pump | 103 | 39 | 37 | 37 | 25 |
| | 30T excavator | 105 | 41 | 39 | 39 | 25 |
| | Truck | 97 | 33 | 31 | 31 | 13 |
| | Generator (150 kVA) | 93 | 29 | 27 | 27 | 8 |
| Erect wall panels, steel framing, roof structures, pipes etc. | 20T mobile crane | 98 | 34 | 32 | 32 | 14 |
| | Grinder (hand tools)[7] | 108 | 41 | 39 | 39 | 30 |
| | Concrete truck and pump | 103 | 39 | 37 | 37 | 25 |
| | Generator (150 kVA) | 93 | 29 | 27 | 27 | 8 |
| | Pump (150mm dia.) | 93 | 29 | 27 | 27 | 8 |
| | Compressor | 93 | 29 | 27 | 27 | 8 |
| | Truck idling | 91 | 27 | 25 | 25 | 6 |

Notes to table:

(1) Appendix A provides an explanation of technical terms
(2) In accordance with Section C.2 of NZS 6803: 1999 inclusive of 3 dB facade reflection
(3) R1 represents façade of 484 Pukahu Road located 440 m from the edge of construction
(4) R2 represents façade of 367 Awaiti Road located 520 m from the edge of construction
(5) R3 represents façade of 377 Awaiti Road located 530 m from the edge of construction
(6) The maximum noise level limit (85 dB $L_{AFmax}$) will be readily complied with at all receivers
**(7)** In our experience grinders are not typically used all the time therefore a 50% duration correction has been applied

## 6.2 Construction noise prediction methodology

The contractor will develop a detailed construction programme prior to the commencement of construction activities. We have assumed an indicative construction methodology for our calculations in its absence.

We have assumed that typical construction techniques will be employed on this project. Initial earthworks will be required, followed by the creation of haul routes for construction traffic.

We have calculated construction noise in general accordance with the method detailed in Annex D[5] of NZS 6803:1999. The method considers the sound power level, periods of operation, distance from

[5] Annex D refers to BS 5228-1:1997 (now superseded by BS 5228-1:2009)

source to receiver and screening of each source, as well as façade reflection and the degree of soft ground attenuation.

## 7.0 RECOMMENDED CONDITIONS OF CONSENT

It is recommended that the following noise conditions are imposed on any consent granted:

1. The noise level from all activities associated with the broiler farms shall not exceed the following noise levels when measured at the notional boundary of any other site:
    a. 7am – 10pm 50 dB $L_{Aeq}$
    b. 10pm – 7am 40 dB $L_{Aeq}$ / 65 dB $L_{AFmax}$
2. Noise levels shall be measured in accordance with the provisions of New Zealand Standard NZS 6801:2008 "Acoustics – Measurement of environmental sound" and assessed in accordance with the provisions of New Zealand Standard 6802:2008 "Acoustics – Environmental noise".
3. Construction noise shall be measured and assessed in accordance with the provisions of New Zealand Standard NZS 6803:1999 "Acoustics – Construction Noise" and comply with the limits in the following table.

| Time | Weekdays (dBA) | | Saturdays (dBA) | | Sundays and Public Holidays (dBA) | |
|---|---|---|---|---|---|---|
| | $L_{eq}$ | $L_{max}$ | $L_{eq}$ | $L_{max}$ | $L_{eq}$ | $L_{max}$ |
| 0630 – 0730 | 55 | 75 | 45 | 75 | 45 | 75 |
| 0730 – 1800 | 70 | 85 | 70 | 85 | 55 | 85 |
| 1800 – 2000 | 65 | 80 | 45 | 75 | 45 | 75 |
| 2000 – 0630 | 45 | 75 | 45 | 75 | 45 | 75 |

## APPENDIX A GLOSSARY OF TERMINOLOGY

| | |
|---|---|
| **A-weighting** | A set of frequency-dependent sound level adjustments that are used to better represent how humans hear sounds. Humans are less sensitive to low and very high frequency sounds.<br><br>Sound levels using an "A" frequency weighting are expressed as dB $L_A$. Alternative ways of expressing A-weighted decibels are dBA or dB(A). |
| **Background sound** | The sound that is continuously present in a room our outdoor location. Often expressed as the A-weighted sound level exceeded for 90 % of a given time period i.e. $L_{A90}$. |
| **dB** | Decibel. The unit of sound level. |
| **$L_{A90}$** | The A-weighted sound level exceeded for 90 % of the measurement period, measured in dB. Commonly referred to as the background noise level. |
| **$L_{Aeq}$** | The equivalent continuous A-weighted sound level. Commonly referred to as the average sound level and is measured in dB. |
| **$L_{Amax}$** | The A-weighted maximum sound level. The highest sound level which occurs during the measurement period. Usually measured with a fast time–weighting i.e. $L_{AFmax}$ |
| **$L_w$** | Sound Power Level. The calculated level of total sound power radiated by a sound source. Usually A-weighted i.e. $L_{WA}$. |
| **Noise** | A subjective term used to describe sound that is unwanted by, or distracting to, the receiver. |
| **Notional boundary** | A line 20 metres from any side of a dwelling, or the legal boundary where this is closer to the dwelling.<br><br>This definition is from NZS 6802:2008. |
| **Prescribed time frame** | 'Daytime', 'night-time', 'evening', or any other relevant period specified in any rule or national environmental standard.<br><br>This definition is from NZS 6802:2008. |

## APPENDIX B PRELIMINARY SITE LAYOUTS

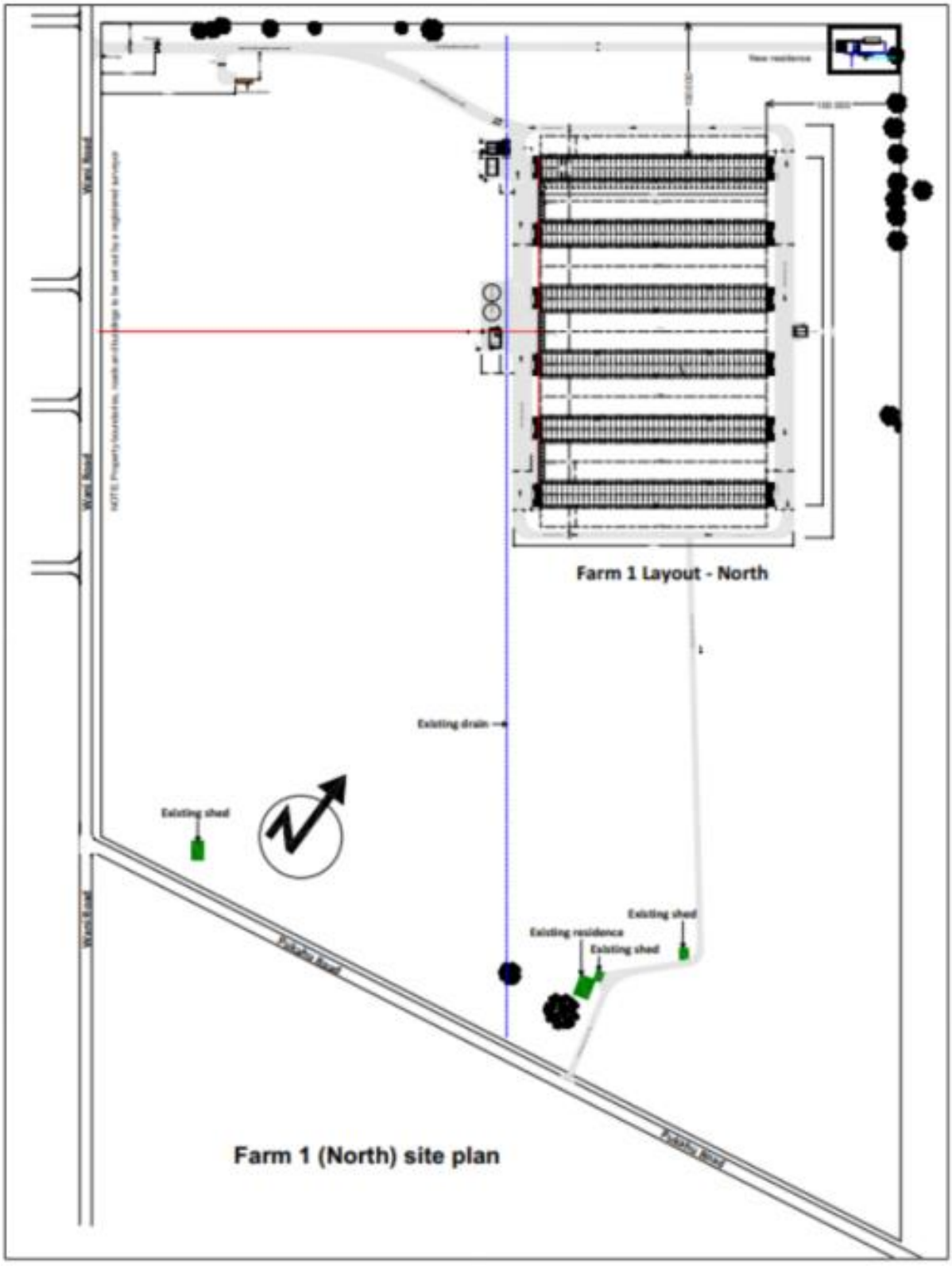



Figure 5: Preliminary Farm 1 Site Layout

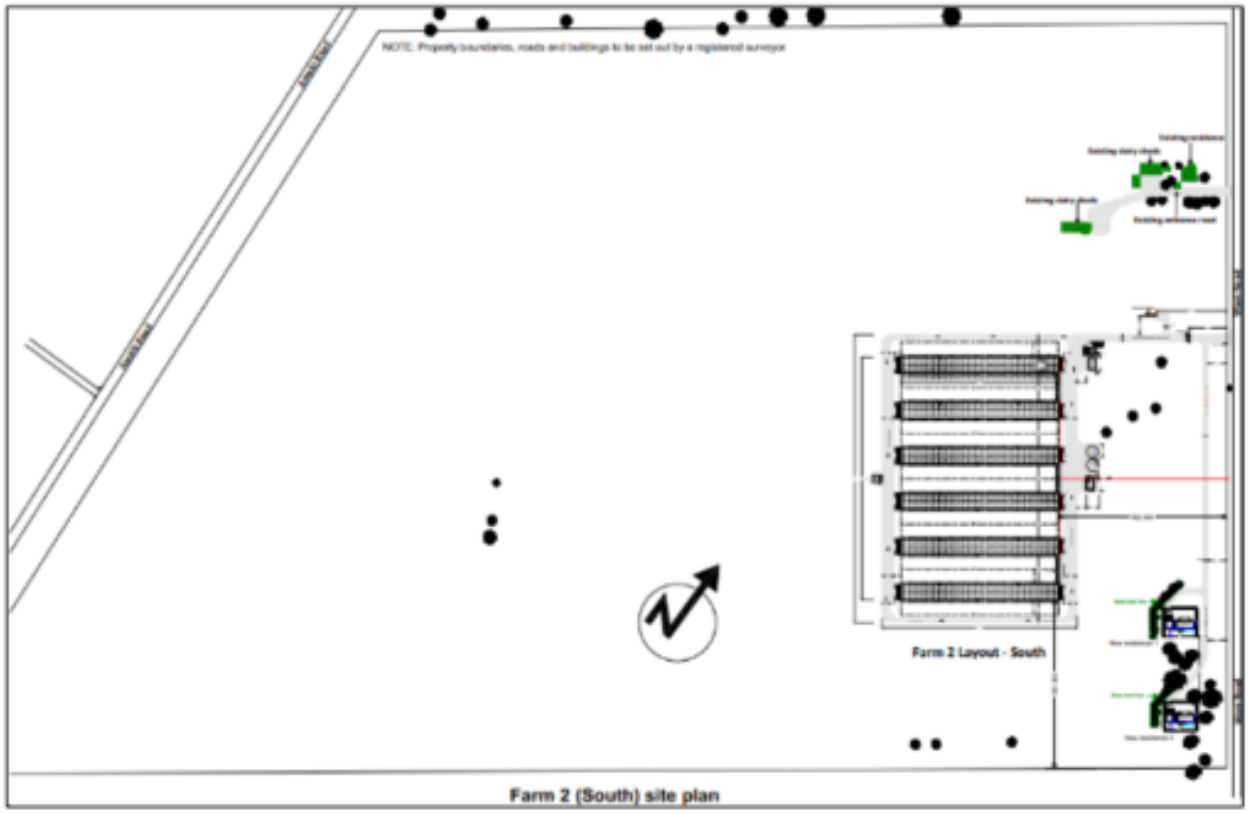



Figure 6: Preliminary Farm 2 Site Layout

## APPENDIX C HDP NOISE PERFORMANCE STANDARDS

*Operational noise*

### 8.3.1.3 STANDARDS

**(1) LEVELS**

Noise shall not exceed the levels set out below when measured in accordance with the provisions of New Zealand Standard (NZS) 6801:2008 Acoustics – Measurement of Environmental Sound and assessed in accordance with the provisions of NZS 6802:2008 Acoustics – Environmental Noise:

**(a) Between *Sites* Within *Zones***

| *Zone* | Standard | $L_{Aeq(15\ min)}$ | $L_{AFmax}$ |
|---|---|---|---|
| ▪ Residential<br>▪ Low Density Residential<br>▪ Rural<br>▪ Coastal<br>▪ Karangahake Gorge | All activities in each of the Residential and Low Density Residential Zones shall be conducted to ensure that the following noise levels shall not be exceeded within any other site contained within that *zone*. | | |
| | All activities in the Rural, Coastal and Karangahake Gorge Zones shall be conducted to ensure that the following noise levels shall not be exceeded within the *notional boundary* of any *residential property* within that *zone*. | | |
| | On all days<br>7.00am - 10.00pm | 50*dB* | NA |
| | On all nights<br>10.00pm – 7.00am | 40*dB* | 65*dB* |

*Construction noise*

**(3) CONSTRUCTION NOISE**

Construction noise emanating from a *site*, where construction activity is of limited duration and where the construction activity is not part of the ongoing land use activity, shall meet the maximum noise standards set out in the tables below for the various *zones*, and shall be managed, measured and assessed in accordance with New Zealand Standard 6803:1999 Acoustics – Construction Noise.

**(a)** Maximum noise standards for construction noise received in the following *zones* are set out in the table below:

**(i)** Rural Zone;

**(ii)** Residential Zone;

**(iii)** Low Density Residential Zone;

**(iv)** Marae Development Zone;

**(v)** Coastal Zone;

**(vi)** Karangahake Gorge Zone;

**(vii)** Conservation (Indigenous Forest) Zone;

**(viii)** Conservation (Wetland) Zone;

**(ix)** Reserve (Passive) Zone;

**(x)** Reserve (Active) Zone.

| Time of Week | Time Period | Typical Duration (*dB*) | | Short Term Duration (*dB*) | | Long Term Duration (*dB*) | |
|---|---|---|---|---|---|---|---|
| | | $L_{Aeq}$ | $L_{Amax}$ | $L_{Aeq}$ | $L_{Amax}$ | $L_{Aeq}$ | $L_{Amax}$ |
| Weekdays | 0630 - 0730 | 60 | 75 | 65 | 80 | 55 | 75 |
| | 0730 - 1800 | 75 | 90 | 80 | 95 | 70 | 85 |
| | 1800 - 2000 | 70 | 85 | 75 | 90 | 65 | 80 |
| | 2000 - 0630 | 45 | 75 | 45 | 75 | 45 | 75 |
| Saturdays | 0630 - 0730 | 45 | 75 | 45 | 75 | 45 | 75 |
| | 0730 - 1800 | 75 | 90 | 80 | 95 | 70 | 85 |
| | 1800 - 2000 | 45 | 75 | 45 | 75 | 45 | 75 |
| | 2000 - 0630 | 45 | 75 | 45 | 75 | 45 | 75 |
| Sundays and Public Holidays | 0630 – 0730 | 45 | 75 | 45 | 75 | 45 | 75 |
| | 0730 – 1800 | 55 | 80 | 55 | 85 | 55 | 85 |
| | 1800 – 2000 | 45 | 75 | 45 | 75 | 45 | 75 |
| | 2000 – 0630 | 45 | 75 | 45 | 75 | 45 | 75 |

**Note:** NZS6803:1999 defines "Typical Duration" as meaning construction work at any one location for more than 14 calendar days but less than 20 weeks. Short-term and long-term durations are less than and greater than this period respectively.

## APPENDIX D PLANT SOUND POWER LEVELS

**Table 7: Octave band sound power levels**

| | Octave Band Centre Frequency (Hz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Source** | **63** | **125** | **250** | **500** | **1000** | **2000** | **4000** | **dBA** |
| Fancom Fan 1680[1,2] | 79 | 79 | 81 | 82 | 82 | 79 | 75 | 86 |
| Fancom Fan 3680[1,2] | 80 | 80 | 82 | 83 | 83 | 80 | 76 | 87 |
| Munters EM 50-52[1] | 63 | 63 | 65 | 66 | 66 | 63 | 59 | 70 |

Notes:
(1) Octave band spectra have been taken from similar fan models based on overall sound power levels from manufacturer data.

(2) Sound pressure level data measured at 2m distance has been converted to sound power based on spherical propagation